Recommendations for The Development Of Interactive Applications of Digital Tv in Electronic Government Field in Brazil

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Abstract

The resources provided by the Brazilian Digital TV model can give rise to several applications for E-Government. Based on the study of a range of proposals and products in the global scenario of *t-Government*, it was identified the main characteristics and contributions through a SWOT analysis. The critical success factors were presented and guidelines recommended for Digital TV applications development for a Brazilian *t-Government*.

Key words: Terrestrial Digital TV, E-Government, SWOT analysis.

Introduction

The Brazilian model of Digital Television (DTV), still under implementation, includes distinct innovative features that revolutionize the traditional model, not only by the characteristics of a higher quality of image and sound, as well as the possibility of interaction and their mobility. The technological improvements brought by the new model expand the characteristics of the Japanese model from which it is derived by adding new functionalities that would be considered the latest model among the existing ones.

Although interactivity has not been fully implemented and regulated, its technical characteristics enable the design of various applications of the DTV model in some areas of knowledge. A major application of resources of DTV is in the Electronic Government (eGov) field, especially because the broad penetration of television households in Brazil and the trend for price decreasing of the digital converters (Set-Top-Boxes), that will make possible the use of the existing TV sets in the new digital system, enabling the digital inclusion.

This article presents an exploration of the main applications of DTV in world scenario, identifying the main characteristics and peculiarities, and applying an analysis of strengths, weaknesses, opportunities and threats (SWOT), as well as to identify the critical success factors. Finally, it is intended to make recommendations for the design of applications of the Brazilian Digital in the area of electronic government.

Digital Tv in Brazil (Dtv)

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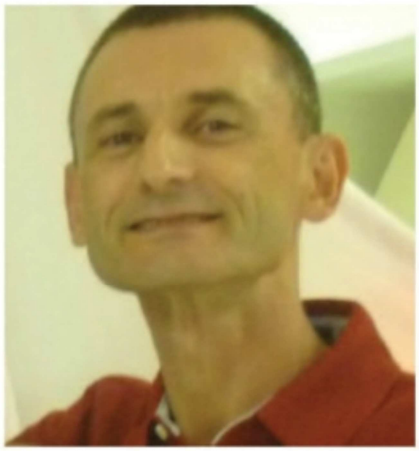
As occurred in other countries, the digitalization process of the television system finally becomes visible in Brazil. Its implementation arises as a promise to open the horizons of citizenship, reducing the cultural and social differences through digital inclusion.

To make it effectively happen, the change caused by the migration of system should have as the final product, features that can meet the needs and expectations of different audiences, providing new ways of expression and promoting social mobilization.

In addition to improving the quality of audio and video, DTV will offer to users the possibility to transform them into active participants in the process of watching TV.

Connected to a Set-Top box, the digital television will allow the interaction with various programs and access a wealth of information and services. Interactivity is undoubtedly the main asset of digital TV, had not yet made an appearance, and lives only in the expectations of those who eagerly wait. It is the key for the access of those who, until then are mere receptors, to the world of production and content sharing through television. The interactivity will allow the spectators, finally, make part of a collaborative network of knowledge construction.

Electronic Government (EGOV)



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The eGov aims to transform the relationship between the governments, citizens and companies, especially in terms of process agility and transparency. According to Sanchez (1996), eGov aims to promote democratic values such as participation, transparency, attention to human dignity, representation and control, by society, on public agents.

EGov is based on the use of information and communication technologies in order to democratize access to information, enhance discussions and stimulate public services delivery focusing on efficiency and effectiveness of governmental functions.

With the same objective as eGov, the *t-Government* arises as an "evolution" from the previous initiatives. The *t-Government* has the advantage of any knowledge requirement in dealing with computers, since the information and services of public interest are available through digital television.

Pagani and Pasinetti (2009) state that, the first countries in Europe to promote the use of t-Government were: Italy, England and the Scandinavian countries. The main application areas of *t-Government* services included: access to public information, online forms and services aimed to citizens (education, mobility, health and mail services).

Methodology

The methodology used in the elaboration of this work can be summarized in Figure 1. Taking the current panorama in world scenario, were analyzed applications (proposals and products) where DTV is used as an access tool for the Government (information, products and services). Then, a SWOT analysis was conducted, identifying the strengths, weaknesses, opportunities and threats of these applications. From the SWOT analysis, were raised the major Critical Success Factors (CSF) generating recommendations that should be taken into account when developing DTV applications for *t-Government*.

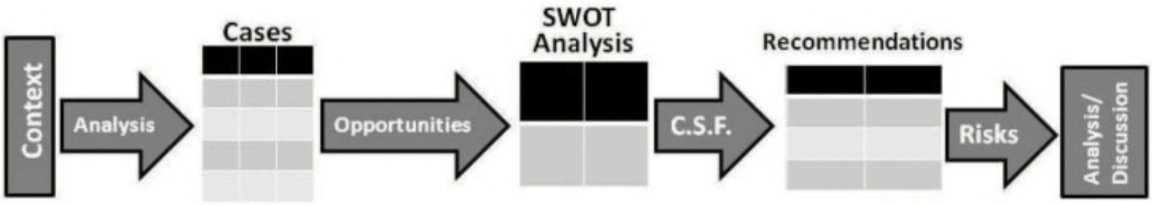

Figure 1 Methodology of this work

Digital Tv Applications for Government

It were researched in the main theoretical the existing proposals (to be developed) and products (already in operation) for DTV, specific to the area of Government. The applications found are listed in Table 1.

Table 1 Applications for t-Government

Application	Description	Country	Situation	Return channel	Classification
Virtual Jury	Jurors participate on the session, vote and have access to Jury information from TV	Brazil	Proposal	Necessary	Transactional
Communication between citizen and City Hall	Citizens can give their opinion about some City Hall achievements, helping in the decision-making process of municipal authorities.	Brazil	Proposal	Necessary	Interactive
Income Tax	Non-taxpayer citizens may make a declarations of exemption from income tax through the remote control	Brazil	Product	Necessary	Transactional

Mortgages	A személyes adataik kitöltésével az állampolgárok elkészíthetik a reál állami hitelek egy szimulációját a Caixa Economica-nál (brazil bank, mely támogatást ad a jelzálogokhoz).	Brazília	Termék	Nem szükséges	Interaktív
Simulation	By filling out their personal information, citizens can do a simulation of real state loans at Caixa Econômica (Brazilian bank that grants for mortgages)	Brazil	Product	Not Necessary	Interactive
Medical appointments	Citizens may schedule appointments in offices through the TV remote control	Brazil	Proposal	Necessary	Interactive
Access to tests	Citizens can do tests through television in order to verify the symptoms of certain diseases.	Brazil	Proposal	Not Necessary	Interactive
Information about Parliament	Channel provides information on the daily work of the Finnish Parliament and encourages people to understand and learn more about democracy.	Finland	Product	Not Necessary	Informative
To make regional content available	The channel provides regional content from London to Scotland, Wales, Northern Ireland citizens and for different regions of England.	Scotland, Wales, Northern Ireland, regions of England	Product	Not Necessary	Informative
Interactive services	Channel offers interactive services related to the programs	England	Product	Necessary	Interactive
Creation of Communities	3 local channels help in creating virtual communities	France	Product	Necessary	Interactive
Information and contact with authorities	Channel provides information regarding local services and allow citizens to contact authorities	England	Product	Necessary	Interactive
Information about Maternity	Channel provides information on maternity services and allows some interaction	England	Product	Necessary	Interactive
Information and interactive services	Interactive services available in many areas, as well as information on social services, employment, tourism and health	Italy	Proposal	Necessary	Interactive

These applications were classified according to the need for technical requirements, in accordance with the proposal made by Bertini (2005): **Informative**, that not require a return channel (superteletext, EPG and information); **Interactive**, that requires a return channel (information request, online bookings and appointments); **Transactional**, further than the return channel, require the incorporation of a security system (exchange of private data and payments).

Swot Analysis

Within the analysis of human and technological interaction environment in the process of eGov and the opportunities created with the implementation of DTV can be highlighted as relevant, six components of the evaluation approach for the scenario of activity: cultural, behavioral, economic, related to market, social and technological.

Taking into account these components, a SWOT matrix was prepared from the observation of the Brazilian scenario with the implementations project of BSTD-TV (Brazilian System of Terrestrial Digital Television), identifying strengths, opportunities, weaknesses and threats as well as the combination of its relations referring to leverages, limitations, vulnerabilities and problems. This SWOT analysis is of fundamental importance for the understanding of the issues to be worked on and the proposed guidance of the implementation model of products and services for *t-Government* in Brazil. This evaluation is represented in the SWOT matrix summarized in Figure 2.

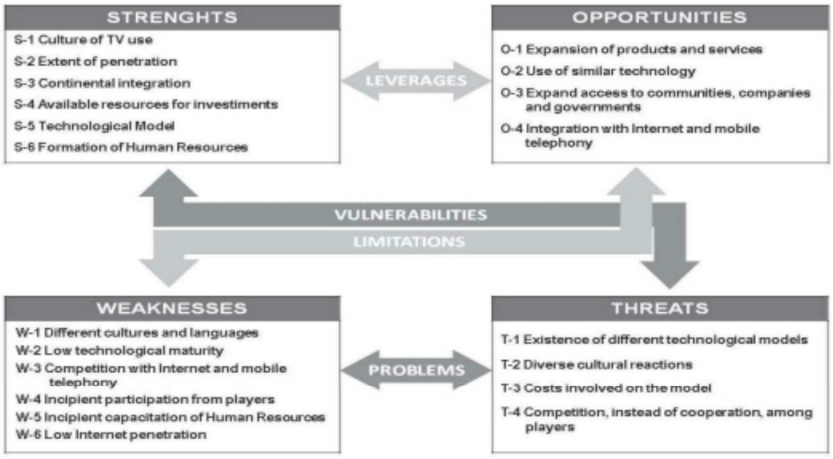

Figure 2 SWOT Matrix

In SWOT analysis, the potential leverages can be deduced through the intersection of strengths with opportunities. The identified strengths are fundamental to making the following opportunities possible: expansion of products and services; use of similar technologies replicated from different solutions on the market; expanding access to the communities they serve (digital inclusion), the provision of public services and electronic commerce; and integration with Internet and mobile telephony.

For purposes of *t-Government*, the development of models, frameworks and standards of construction and use of applications, as well as training programs for human resources in *t-Government* constitutes enhancing actions, i.e. the components from leverage made possible by this technology.

The vulnerabilities are identified by crossing the strengths with the threats. The strengths already identified

in the model are confronted with the following threats: the existence of different technological models in the global market, risks of cultural and behavioral reactions in different markets, costs involved in implementing a differentiated model, and competitive behavior instead of cooperative behavior among technological players. In addition, the vulnerabilities suggest directions for combat actions such as the effort for replication and adaptation of models in different communities and encouraging the development of global partnerships and consortia.
The next step in the SWOT analysis is the identification of limitations through the crossing of opportunities with the following weaknesses: different cultures and languages in various applications, low technological maturity of the Brazilian model (BSTD-TV), competition among DTV, mobile computing and Internet, incipient participation of global players, incipient qualification of human resources (developers and users), and low penetration of Internet in Brazilian population.

The actions of optimization and combat to vulnerabilities already identified are the antidotes for the accelerated evolution of the implementation of *t-Government* in Brazil.

Finally, when crossing weaknesses with threats it is confirmed the problems highlighted in the limitations and vulnerabilities, forwarding issues on qualification of human resources in the development of technical solutions for the applications production and in the generation and dissemination of content for *t-Government*. On the other hand, low penetration of Internet in the Brazilian population caused by high entry costs, low technological maturity of the model still in development and the incipient qualification of human resources require the development of specific public policies and solutions for digital inclusion in poorer social layers and in specific communities like the young and elderly, for example.

Critical Success Factors (csf)

At the conclusion of the SWOT analysis matrix, applied to the scenario of the Brazilian project of DTV implementation, it was developed as complementary, the Critical Success Factors (CSF), in order to direct the following recommendations on the use of DTV technologies in *t-Government*:

Critical Success Factor	Recommendations
Commitment of international and regional organizations	To involve the international regulatory and foment bodies, to ensure the financial aspects of research, integration and interoperability of technologies used in different global models, in addition to concern the inclusion of poor communities and poor/developing countries
Development of models, frameworks and standards	Facilitating the expansion of products, services and competitive applications of global penetration, reducing costs, increasing supply and reducing the absorption time by the market
Mobilization of research, education and foment institutions	Encouraging the creation of models, credit lines and training for specialized labor power in building models, standards, products and services, the generation and dissemination of content in digital TV

Technological integration among Internet, DTV and mobile telephony	To develop digital convergence necessary for the implementation and use of different media for the process of t-Government in a dynamic and integrated way
Encouraging the expansion of DTV services in poor communities	To develop policies and models of digital inclusion for excluded communities through models of community use and financing to the equipment and interactivity processes in DTV
Partnerships and alliances between technology and content providers	Encouraging the involvement of software, hardware, communications, education and broadcasting companies to accelerate the divulgation, amplification of supply and use, by the Brazilian society, of DTV interactive technologies
Adequacy of public policies	To regulate the development of models, frameworks, computer applications, beyond the protection of copyright content and use of Digital TV

The SWOT matrix analysis complemented with the determination of the Critical Success Factors (CSF) and the recommendations directed to the identification and development of projects and public policies that make possible the application of solutions of *t-Government* using the DTV interactivity. More than an alternative channel for additional Internet-based services (information and services to citizens), the DTV has a potential to transform the relations with citizens, especially in the interactive processes of social participation (plebiscites, health services, education and public security).

Recommendations and Further Works

Santos (2007) considers that the eGov potentially could achieve a larger portion of the population using the interactivity of DTV than with computers, since they are present in only 12% of households, and TV in more than 90% of residences, as indicated in the surveys carried out by IBGE – Brazilian Institute of Geography and Statistics, in 2004. Another factor is that the empowerment of *t-Government* is developed making use of experiences acquired from years of research in eGov applications, as a result of media convergence. With this purpose, the convergence of media must be characterized by the adaptation of existing strategies in eGov for DTV environment, which has some different characteristics such as high-quality of video, low availability of resources, interaction via the remote control and various scenarios of availability for the return channel.

Santos (2007) also indicates that with DTV the user needs to interact with television becoming an active element in the communication process as occurs in eGov programs. The interactivity is a concept that does not exist in traditional analogical systems. Therefore, Brazilians are not familiarized to interact with the television, an obstacle to limiting the successful implementation of *t-Government* programs.

Considering the technological aspect, other limitations must be observed. Despite the fact of the STB (Set-Top-Box) presents computational resources, this can not be confused with a computer. In general aspects, its processing power and the input and output devices are limited compared to the computers (usually only be used the remote control) and the screen, which will be the one existing in the televisions found in Brazilian

households that has an inferior resolution if compared to computer screens.

Although the use of incipient technologies of eGov in DTV and in fact the low interactivity in European and North American models, as shown in the cases raised in this paper, the BSTD-TV model has, from its proposal of interactivity, a very interesting potential of evolution and development of applications and services. A contribution reference to this process has been the models in eGov currently in use, meaning a significant saving of time spent in the selection, modeling and implementation of new applications and services for DTV. One of the critical factors essential to this process is the equating models and public policies related to bidirectional interactivity by the Brazilian Government.

The use of the analysis of the SWOT matrix has identified that the leverage of the results depend on continued investment in developing models, standards, frameworks, applications and uses of digital TV in eGov and in the increased resources for infrastructure and human resources training. To minimize vulnerabilities, is suggested the effort of reproduction and adaptation of existing models in other systems or markets and encouraging the development of global partnerships and consortia. In addition, to reduce the identified restrictions, it is proposed the development of specific public policies and solutions for the digital inclusion of the poorest sections of society and specific communities.

The amplitude of the implementation process of DTV in Brazil depends on the synchronism and integration between organizations, the development of public policies, encouragement the development of partnerships by suppliers of technology and content, of the mobilization by research and innovation institutes, integration and technological convergence, and the expansion of interactivity technologies penetration in the layers of digitally excluded.

The cases presented demonstrate the possibility of applying technological solutions interactive Digital TV Electronic Government. The SWOT matrix and the Critical Success Factors worked in an environment of mechanisms of integrating these technologies with the day-to-day society.

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